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ABSTRACT

The components of existing district instructional information systems are identified and illustrated by examples from field studies and descriptions of work with two districts in defining their instructional information systems and assigning costs. Instructional information systems are loosely organized methods of providing past and present information about student attainment and program evaluation. These are analyzed into eight components (five "core" and three "contributory"): (1) specified users, (2) specified uses, (3) specified types of information inputs/outputs, (4) specified information delivery procedures, (5) specified monitoring of system functioning and of system use, (6) training for users in data-based decision-making and implementation, (7) availability of resources to support action planning, and (8) availability or resources to support implementation. Elements of each component common to all eight districts under study are then listed, followed by three case studies of instructional information systems: a student achievement model, a school improvement model, and a staff development model. Then a three-step cost analysis procedure is described: (1) identifying the system to which costs are assigned, (2) identifying costs associated with the system, and (3) evaluating these costs. The paper concludes with an impact assessment procedure, focusing on the extent to which an instructional information system impinges on various stages of decision-making. (TE)

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CSE

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Defining School District Instructional Information Systems

by

Adrianne Bank and Richard C. Williams

Introduction

The Evaluation Systems Project of the Center for the Study of Evaluation, in its 1983-84 work, focuses on conceptualizing and identifying both the costs and the impacts of different models of district operated instructional information systems.

In prior years, our research unit has conducted field studies in eight districts where district managers had developed linkages between instructional decision making on the one hand, and data from tests or from surveys on the other. Each of the eight districts had evolved a set of components to link data with instructional decision making. The specifics of these components were unique to the districts' own environment, history and personnel.

However, there were some elements which we saw as common in the development and evolution of instructional information systems. These included: a stable external environmental setting; within-district presence of "idea champions" and a critical mass of long-term supporters; the availability of sufficient resources, both fiscal and technical, over a relatively long period of time -- six to eight years in many cases. (Williams and Bank, 1981).

Another striking element which appeared to characterize our eight districts was the ad hoc nature of the development of the system. In none of the districts had there been a blue-print or a timeline for developing an information management system. Indeed, the term "information management system" or "instructional information system" was not in common use in these districts. Rather, what we observed was a loose evolving arrangement among individuals, sometimes formalized in job descriptions but more often informal, that combined the collection and analysis of data with a delivery system to users at the classroom, school, central office and board levels concerned with instruction.

Thus, it is important to note, that the term "instructional information system" is a construct which the Evaluation Systems Project has developed. This construct suggests that what goes on in school districts which link evaluation, testing and instruction may bear a partial resemblance to management information systems that have developed in other organizations.

The following discussion is our initial attempt in identifying the components of existing district instructional information systems. We will illustrate this discussion with examples from our field studies. We will then move on to describe how we worked with two districts in defining their unique instructional information systems so as to be able to assign costs to and assess impacts of the particular systems.

What is a School District Instructional Information System?

In its simplest and most obvious form, an instructional information system is some method by which information of some kind is transmitted to and used by someone or some group in a school district in relation

particularly to the content or delivery of instruction. But we want to put more specific limits on such a definition.

The topic of information and its use has been a research subject in its own right. There are over 20,000 titles under the term "information" in the ERIC system (Mansfield, 1983). Human beings are capable of organizing vast amounts of information into patterns which influence their decisions and their actions. This "body of knowledge that administrators and policy makers use spontaneously and routinely in the context of their work . . . - the entire array of beliefs, assumptions, interests and experiences - " has come to be called working knowledge (Kennedy, 1982). Such working knowledge may often interact with -- that is, influence and be influenced by -- formal social science data. It is, however, this latter type of data -- intentionally collected and analyzed in a prescribed and standardized format -- which we are calling "information."

The term "systems" like the term "information" is in widespread use, particularly in the literature on organizations. When used here, it does not describe the school district as a whole, but rather refers to a separate subsystem which has its own purposes, organizational structure, and linkages to that larger environment.

Instruction is a third broad term which has different meanings depending on context. We use it here to refer specifically to intended interactions within the classroom or school environment that affect student learning. The decisions that affect those interactions -- such as texts, number of aides in the classroom, amount of time to be spent in a subject area, teaching methods -- may be made by boards, committees, principals,

teams or individual teachers. Whoever the decision makers, and whatever decision implementers, and whatever the topic under consideration, if it pertains to the schools' shaping of students' learning, we count it as instructional.

As indicated earlier, the term instructional information system was chosen to suggest a rough analogy to management information systems. A management information system has been defined by Walter J. Kennovan (1970) as "an organized method of providing past, present and projection information relating to internal operations and external intelligence. It supports the planning, control and operational functions of an organization by furnishing uniform information in a proper time frame to assist the decision-making process." Instructional information systems in school districts might be characterized as loosely organized methods of providing to those concerned with instruction past and present information relating to student attainment and program evaluation. Instructional information systems support users' decision making relating to instruction by furnishing them with particular and limited types of information in a time frame and format appropriate to their decision-making processes.

Components of District Instructional Information Systems

As noted earlier, district instructional information systems are rarely conceptualized as such by people within school and district settings. The five components, which we categorize on the next page as "core" components, are terms we derived from the literature on management information sytems. We were able to identify some of these components as present and plainly visible in some districts even though they were not so named by district respondents. The presence of others we could infer from

interviews with district personnel. In some districts, one or two components were missing or not in evidence to our field researchers. In addition, the elements included within each component varied from district to district.

The three additional components which we have labeled as contributory are not part of the description of most management information systems. They were, however, present to some extent in all eight of our districts. They were there to provide users of the data with guidance and assistance for making instructionally-related decisions and for carrying out those decisions in the central office, in schools and in classrooms. It was asserted by the central office personnel who had established the systems that these extra-system components were necessary to system maintenance. Without them, they said, it would be likely that principals and teachers would revert to exclusive reliance on working knowledge.

Core components of a district instructional information system:

1. specified users
2. specified uses
3. specified types of information inputs/outputs
4. specified information delivery procedures
5. specified monitoring of system functioning and of system use

Contributory components of district instructional information systems:

6. training for users in data-based decision making and implementation
7. availability of resources to support action planning
8. availability of resources to support implementation

The following is a comprehensive listing of the elements included by all eight districts within each component. Since districts varied from one another on the purposes of their instructional information systems, only a small subset of the elements of each component was relevant to a given

district. Following this catalogue we will describe three models of instructional information systems on a case study basis.

1. SPECIFIED USERS:

teachers;
principals;
others in schools, such as media and learning specialists, substitutes, aides;
advisory committee members;
parents, media, prospective residents, real estate developers;
central office personnel concerned, for example, with curriculum, supervision, staff development, personnel;
school board members.

These users can be thought of as either direct or secondary users of the system; either regular or episodic users; either active or passive users. In some districts, the ratio of specified - that is, intended users to unspecified users is large; in other districts there are very few unspecified users.

2. SPECIFIED USES:

planning instruction, identification of subjects areas in need of additional time or attention;
placing, grouping, regrouping of students;
remediating or supplementing students' instruction;
monitoring student progress;
identifying parent, teacher student, opinions and attitudes;
determining the allocation of school level resources;
identifying school-wide needs;
selecting texts;
establishing school and district image;
communicating with interested others - e.g., federal, state and local organizations

3. SPECIFIED TYPES OF INFORMATION INPUTS/OUTPUTS:

commercial norm-referenced test scores;
district-developed criterion-referenced test scores;
demographic and census data;
longitudinal individual student data;
attitudes of students, teachers, parents;
records of attendance, transiency, vandalism, etc.

4. SPECIFIED INFORMATION DELIVERY PROCEDURES:

formats - printouts, written reports, oral reports, graphic presentations, individual and small group briefings;
cycles - periodic, coordinated with other activities, as needed;

5. SPECIFIED MONITORING OF SYSTEM FUNCTIONING AND OF SYSTEM USE:

informal feedback;
ad hoc or standing committees reviewing information inputs, outputs;
records of system use;
supervision of subordinates by superiors, peer review

6. TRAINING FOR USERS IN DATA-BASED DECISION MAKING AND IMPLEMENTATION:

in interpreting test scores;
in alternative methods of raising student achievement;
in alternative methods of using student test scores
in interpreting survey data;
in inferring action alternatives from data;
in deciding among competing alternatives;
in implementing change;

7. AVAILABILITY OF RESOURCES TO SUPPORT ACTION PLANNING:

trained individuals such as media or learning specialists;
budget for release time, substitutes, conference attendance;

8. AVAILABILITY OF RESOURCES TO SUPPORT IMPLEMENTATION:

trained individuals such as media or learning specialists;
budget for release time, substitutes, conference attendance;

The eight districts in which we did field studies had unique instructional information system configurations. For three of these districts we will provide brief word pictures to illustrate alternative instructional information systems.

District A: Student Achievement Model

The purpose of this instructional information system is to individualize instruction. The direct users of the system are teachers and principals. Teachers use the test score information which is the output of the system to plan instruction, to place students in classes, to group and

regroup students, to assign remedial or supplementary materials to communicate with parents. Prinicpals use the data to monitor individual and group progress of students, to monitor teacher activities, to communicate with parents, and to share with one another school progress so that district policy making can be informed by principal input. The type of information which the system inputs are students' criterion-referenced test responses. The criterion-referenced tests are keyed to a grade-by-grade district scope and sequence in math, reading, language arts. These tests are administered by teachers on a quarterly basis. The scores come back organized by objective, by student, by reading group, by class, by grade level and by school. Turn-around time from test administration to teacher receipt of printout received is approximately a week.The format of the instructional information system's output is a computer printout and the routine procedure used to deliver it to teachers is direct mail from the district office.

In this district, there are many ways to monitor the system functioning and system use. Learning specialists in each school make sure that the tests are distributed, administered, and correctly processed. The learning specialists also assist teachers in analyzing and interpreting the scores and in making instructional plans based on these interpretations. The principals review all test scores, hold conferences with teachers during the year to discuss individual children, use the previous year's scores in making plans for the subsequent school year. Both teachers and principals use the criterion-referenced tests and the objectives to which they are indexed in conferences with parents and between-conference reporting of student progress.

In terms of contributing components of the instructional information sytem: The learning specialist in each school trains teachers in the interpretation of the test scores and in specific action planning and implementation activities. The entire criterion-referenced testing/district scope and sequence system is supported by an elaborate multi-level professional development program. In this program, teachers are required to attend level-one courses where a diagnostic/prescriptive instructional methodology compatible with the criterion-referenced testing orientation is presented. Between level-one sessions, the PDP coordinator observes in classrooms to make sure that teachers' applications of the teaching methodology is appropriate. Second and third-level PDP programs are offered based on an annual survey where teachers indicate their preferences for coursework. The PDP program, including the release time for teachers, the training of substitutes and aides, and additional conference attendance, is part of the regular district budget.

District B: School Improvement Model

The purpose of this instructional information system is to facilitate school site planning decisions about the allocation of resources to meet needs perceived by parents, teachers, and students. The primary users of the system are school site councils, parents and teachers, who divide themselves into subject matter committees to make plans for subsequent school years and to monitor the implementation of previously-made plans. Principals are secondary as are teachers not on the school site council.

The uses to which the data are put include the identification of subject areas in need of attention, determation of the allocation of discretionary school resources for identified school-wide needs, analysis of the

opinion and attitude data from parents, teachers and students in conjunction with student outcome data from standardized norm-referenced tests.

This district, on a once-a-year basis, administers a standardized test of basic skills. The printout is received back from the test publishers by school, by subscores. Further analysis is done by the district office. This information is made available to the school site planning team. In addition, the district has developed a parent and a teacher attitude survey, sent out once a year, collated by the district, organized in graphic format, and distributed back to each school site council. Each school, furthermore, develops and distributes a "Smiley Survey" to assess student attitudes toward particular subject areas.

The central office of the district provides written reports to the School Site Council, presenting it with data not only from the current year but from previous years. When the system was in its infancy small group briefings were held; district officials say that they have subsequently become unnecessary as new school site members are socialized into the process by more experienced colleagues. The distribution of the reports follows an annual cycle. The tests are administered in February, the surveys go out in March, the information is collated and fed back to the school site councils in April, decisions are made in May, plans are implemented starting in September, school site council updates the timelines for the plans as the school year proceeds, monitoring by the school site council of the implementation of aspects of the plan occurs at meetings throughout the winter. The cycle then repeats itself.

As for contributing components: Training for teachers and parents occured when the system was first installed. Such training included group

process skills, communication skills, decision making skills, skills in interpreting test score terminology. Such training is no longer provided by the district routinely although it is available on an as-requested basis. The district provides release time for teachers to engage in school site planning. The resources for implementing the action plans made by the site council come from the California School Improvement Budget and have been regularly available over the past five years.

District C: Staff Development Model

The purpose of this instructional information system is to enable central office staff to train teachers and principals in those subject matter areas in which students demonstrate deficiencies. The primary users of this system are the staff development, curriculum, and supervisory personnel in the central office. Indirect users are principals and teachers. The uses to which the information is put are primarily planning and conducting ongoing and summer staff development activities which either train teachers in how to instruct students in a particular area or encourage teachers to develop new text or supplementary materials. The information inputted into this system comes primarily from a state-wide assessment test which compares school-level student achievement across the state. The press and the school district receive from the state the printouts of the scores organized in high-low order of school attainment. Subsequently, district officials receive more precise score breakouts. This data is supplemented by newly developed district-wide utilization school proficiency tests. In this district, there is no explicit monitoring of system functioning and system use.

As to contributing components: Since the primary users are central office personnel, there is limited need for training for them in decision making and implementation. Substantial amounts of district resources, both in terms of time and money are made available to support action planning and the implementation of staff development activities.

Defining a District's Instructional Information System So as to Assign Costs

It is one thing to bound, conceptually, a certain set of district activities by the term "instructional information system." It is quite another to examine ongoing district operations and try to assign costs to that portion of their operations which represent components of such an instructional information system. In order to assign costs to any phenomenon, one first has to define that phenomenon in terms that are common to participants and to observers. . This is particularly difficult in the case where the phenomenon is a construct whose elements are embedded in the ongoing activities of an organization and where the construct is not, in the view of the organization actors, a discrete entity with visible and definable limits.

We embarked upon the cost study of instructional information systems for several reasons. First, we anticipated that districts desiring to establish and maintain such systems would find information about the costs helpful in making decisions about the worthwhileness of their efforts to link testing, evaluation and instruction. Secondly, we believed that providing estimates of the resources needed by instructional information systems might be appropriate to within-district decisions that were made about the operations of the system or its components. We anticipated that

generating more specific "cost awareness" of the system and its components might suggest areas in which future efficiencies might be pursued.

There are three steps in doing any cost analysis. The first is identifying the system to which costs are to be assigned. The second is to identify the costs associated with that system. And the third is to evaluate the costs associated with that system. (Catterall, 1983.)

We envisaged two possible approaches to the first step. Using one approach, we would have presented districts with definitions of components and their related elements, asked appropriate individuals to check off those which were in existence in their district. The other approach, which we adopted, was to ask for a general district definition of why the central office wanted to link evaluation and testing data with instruction. Instead of looking at the costs associated with pre-defined components of the instructional information system, we began with district activities as understood by district personnel.

In order to identify costs associated with the system - the second step of the cost analysis process - we instructed district personnel to list all activities which could be considered germane to the system which they and we were interested in. We asked them to devise categories that were mutually exclusive and sufficient to be comprehensive.

For each category we asked for the following:

- a description of activities;
- a list of all personnel devoting full or part time to the activities (including administrators, teachers, counselors, etc.);
- an indication of pupil time, volunteer time, and parent time devoted to each activity;

° a list of dollar expenditures for consumable material, for major capital equipment, for consultant and contracted services;

° a description of funding sources in terms of federal, state, local or other grants.

The third step of the cost analysis pr , that is, the evaluation of the costs associated with the system, is yet complete.

Defining a District's Instructional Information System So As to Effect Impact

As with the assignment of costs, the first step in assessing the impacts of any system is to define the system in terms that are understood by both observers and participants.

Again, as in the cost study, we found it more desirable to start with a general statement of district purpose and move to their understanding of district activities that could be regarded as related to an instructional information system, than to start with a preworded definition.

We developed an eight-step set of generic procedures by which to investigate and study the impact of instructional information systems.

1. identify system purpose
2. define the system's components
3. identify intended "points of impact" - that is, where the system interacts with other district, school and classroom operations
4. identify the primary and secondary users
5. ask respondents from our user populations for examples of their own behaviors and their own attitudes at likely "points of impact"
6. ask respondents about the influence of each system component on their own behaviors and attitudes
7. ask respondents about perceptions of positive and negative consequences of the entire system on themselves and other users
8. identify the intended and unintended impacts of the entire system on users.

We tried to apply these eight steps in two different districts, District A and District B, as described earlier in this paper.

In District A, we started out with several conversations with the director of Testing and Evaluation. He described the major purpose of the instructional information system of his district as that of individualizing instruction. He described the direct users of the system as teachers and principals, and the primary use to which they would put test data was that of individualizing instruction to maximize student learning. We decided with him that our respondents would be a sample of teachers and principals in all of the elementary schools of the district. We developed a short, one-half hour interview schedule for both principals and teachers asking them to describe how a particular subject area was taught in their classrooms. We asked them to estimate how many teachers taught in the same way that they did. We then listed for them the various components of the instructional information system. We probed for the influence of each of these components, asking for specific personal examples. We then moved on to ask what difference it would make to them if the various components of the district instructional information system did not exist. The final section of the interview asked respondents to react to a checklist about the extent and nature of impact of the instructional information system on teachers, on principals, on parents, and on students.

In all our interviews we focused on respondents' attitudes and behaviors, on respondents' perceptions of the relationship between their current attitudes and behaviors and district policy and practice.

The analysis of the impact of the district instructional information systems, currently under way, will illustrate the extent to which there is

homogeneity in respondents' responses as to their own teaching practices and the influence on those practices. It will then move on to analyze respondents' self-reports of impact in terms of their use of system components, their attitude toward system components, and their explanation of influential antecedents to these uses and attitudes.

In District B, project staff also met with the person in charge of the instructional information system. He stated the purpose of his district's system as the facilitation of school site planning decisions. Our impact study therefore was designed to focus on the degree to which the system had impact on the various stages of the planning and decision-making process in the school site council. We asked the director of the instructional information system to identify the primary and the secondary users of the system. We determined that the primary users were those teachers and parents involved on the school site council. We identified a sample of five elementary schools and one high school in which the director believed that the management information system was operating as intended. We were not evaluating the implementation of the instructional information system; rather, we were assessing the impact of that information system when it was functioning as desired.

Our sample, therefore, was made up of school site council members for the 1981-82 academic year. We obtained copies of each school site council's plan for that year. We selected one major decision that was made and explored, in half-hour interviews, the way in which the components of the instructional information system impacted that decision. Subsequent to that detailed exploration, we asked each respondent if the process he or she had just was typical or atypical of the processes on other issues. We

then asked additional questions about the impact of specific components of the system on respondents' behaviors and attitudes. A further question probed respondents' views of the effects of hypothetical termination of the instructional information system.

The analysis of the impacts of this district's system focuses on the extent to which the instructional information system ~~impacts~~ various stages of decision making. These stages have been collapsed into three: 1) problem identification and clarification, 2) solution generation, and 3) solution selection. Accompanying this analysis of impact will be the presentation of likely explanations or impact in terms of district history, personnel, purposes.

Summary

It is clear that some school districts have undertaken "heroic" efforts to coordinate operations which in many school districts function autonomously and independently. These operations may include those of testing, evaluation, instructional planning, staff development, text selection, staff supervision. The coordination of these activities into an instructional information system which not only provides feedback but also feeds foward, into decision making on the policy, management and operational levels of districts.

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